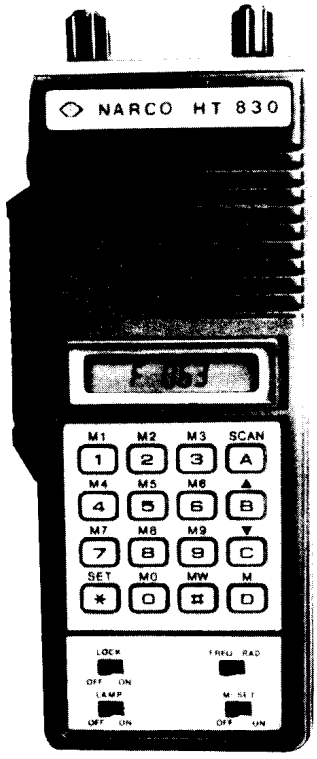
NARCO HT-830
HANDHELD NAV/COM

920 CHANNELS



OPERATORS MANUAL

MANUAL PART NUMBER 03117-0620

NARCO AVIONICS INC.
270 COMMERCE DRIVE
FORT WASHINGTON PENNSYLVANIA, 19034

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1.1 INTRODUCTION

This manual contains product description, features, specifications, available options and operating instructions.

It is not intended as a maintenance manual; therefore, service information in the form of theory, alignment or schematics is not provided.

2.1 PRODUCT DESCRIPTION

The Narco HT-830 is a microprocessor controlled hand held 720 channel communication transceiver covering the band of 118 to 135.975 MHz and a 200 channel Nav receiver covering the band of 108 to 117.95 MHz. The HT-830 antenna is removable and may be connected to the aircraft's COM antenna.

Nav and Com frequencies are displayed on a liquid crystal display (LCD) and are entered on an easy to use 16-key keyboard. In the RAD mode of operation the VOR Radial is displayed. The user is alerted when an illegal setting is made by the appearance of the letter "E" (error) in the display. Ten pre-programmable Nav or Com frequencies may be stored in a non-volatile memory and manually selected for use or automatically scanned by one of three selected automatic scanning modes. A memory lockout feature is provided in which programmable frequencies can be locked out of the manual or automatic scan.

The HT-830 is powered by a rechargeable, quickly changed, NiCad battery pack. An optional non-rechargeable alkaline battery pack for emergency use is available. The user is alerted when the battery pack voltage has dropped below its useable limit by the appearance of the letters "BATT" in the display. The liquid crystal display can be illuminated to facilitate viewing in darkness.

3.1 DESIGN FEATURES

Microprocessor controlled circuitry
720 COM channels
200 NAV channels
10 pre-programmable non-volatile memory locations
Keyboard data entry
Large Liquid Crystal Display (LCD)
Quickly changed, rechargeable NiCad battery pack
4 Scanning Modes: Manual (MAN); Automatic (SCAN, SRCH, OPEN)
Priority channel scanning in SCAN mode
Squelch-Adjust Control
Nominal 2 watts RF Transmitter
Lightweight, 1 lb. 4 oz. (560 grams)
Receiver sensitivity 1.5 microvolts for 6dB stn/n
Separate external speaker/microphone jack
Inputs for normal and quick charge
Quick removable (BNC) antenna
VOR Radial displayed in Rad mode

4.1 SPECIFICATIONS

GENERAL

Navigation channels : 200 (50 KHz steps) from 108.00 to 117.95 MHz
Communication channels: 720 (25 KHz steps) from 118.00 to 135.975 MHz
Memory channels: 10 channels
Weight: 1 lb. 4 oz (560 grams)
Dimensions: Width 2.75 in. (69.85 mm) Height 6.75 in. (171.45 mm)
Depth 2 in. (50.8 mm)

TRANSMITTER

Power: 1.5 watts carrier (minimum), 2 watts nominal
Frequency Stability: ±0.002%
Modulation: 6A3, 70% minimum
Frequency range: 118.000 to 135.975 MHz (720 channels)
Spurious radiation: -46 dB below carrier
Antenna impedance: 50 ohms

RECEIVER

Frequency range: NAV (108.00 to 117.95 MHz)
COM (118.000 to 135.975 MHz)
Audio output: 0.5 watts into 8 ohms (speaker)
30 milliwatts into 600 ohms (headphones)
Receiver sensitivity: 1.0 microvolts max for 6 dB s+n/n
Image rejection: 50 dB or greater
Receiver Selectivity: 6 dB ±15 KHz, 60 dB ±30 KHz
Squelch Sensitivity: Adjustable carrier, AGC type

POWER SOURCE

9.6 Vdc, 500 mA, NiCad Battery
Battery full charge time: 150 mA maximum @ 5 hrs (using optional base charger)
45 mA maximum @ 17 hrs (using supplied wall charger)
Battery life per charge (approximate): Receive only: 8 hrs.
Transmit 10% duty: 4-6 hrs.
Transmit 30% duty: 2-4 hrs.
Number of battery recharges (full discharge to full charge): up to 300

TEMPERATURE

Operating range: -30 to + 50°C

5.1 PRELIMINARY INSPECTION AND UNPACKING

Upon receipt of the HT-830, inspect the shipping container to attempt to determine if equipment may have been damaged during shipment. Note damage, if any.

Carefully unpack the unit and inspect it for any damage that may have occurred during shipment. Refer to Sections 5.2 and 5.3 and inventory the contents of your shipment.

5.2 HT-830 AND SUPPLIED ACCESSORIES

An HT-830 is ordered using part number 0 3117-0300. This part number is comprised of the following items:

ITEM	QTY	DESCRIPTION
1	1	HT-830 Handheld NAV/COM
2	1	NiCad Rechargeable Battery Pack (Part No. 50900-0001)
3	1	Battery Wall Charger (Part No. 50901-0001)
4	1	Flexible Antenna (Part No. 50902-0001)
5	1	Hand Strap for HT-830 (Part No. 50903-0001)
6	1	Earphone (Part No. 50904-0001)
7	1	Operator's Manual (Part No. 03117-0620)

5.3 HT-830 OPTIONAL ACCESSORIES

The following list comprises the available accessories for the HT-830:

ITEM	ORDER NUMBER	DESCRIPTION
1	50900-0002	Non-rechargeable alkaline battery pack
2	50900-0001	Rechargeable NiCad battery pack (9.6Vdc/500 maH)
3	50905-0001	Leather cowhide case with snap-off front flap, built-in belt clip, and shoulder strap
4	50902-0001	Flexible rubberized antenna with BNC connector
5	50907-0001	Handheld remote combination speaker/microphone complete with connector ready to use. No adjustments necessary. For ground use only. Not receommended for use in aircraft.
6	50932-0001	Mobile NiCad battery charger. Plugs into cigarette lighter of aircraft or car, which permits NiCad battery charging or operation of the HT-830.
7	50906-0001	Desktop quick-charger and stand. The HT-830 is placed upright into a well in the stand which permits the quick-charging (5 hrs.) of the HT-830's installed NiCad battery pack. An additional battery charging socket permits the simultaneously slow charging of an extra NiCad battery pack. The HT-830 may be operated in both the receive and transmit modes while it is charging, but ONLY when a NiCad battery pack has been installed.

5.3 Continued

ITEM	ORDER NUMBER	DESCRIPTION
8	50926-0101	6-inch adapter cable which permits the interfacing of aircraft type headphones and microphones to the HT-830. One end of the cable connects to the HT-830's top panel external speaker/microphone connector; installed on the other end of the cable are standard headphone and microphone jacks. An external push-to-talk switch must be supplied and installed by the owner to complete the interface.
9	50908-0001	External speaker/microphone connector only. Mates to the HT-830's top panel external speaker/microphone connector. This connector is used when the owner wishes to design and fabricate his own interface adapter cable (see item 8).

6.1 HT-830 MAINTENANCE INFORMATION

The HT-830 is not field repairable. Should a service problem arise, write a note explaining the problem. Include in the note your name, shipping address and type shipping desired (UPS, Federal Express, etc. Include the note with the HT-830 and ship prepaid to:

NARCO AVIONICS, INC.
270 Commerce Drive
Fort Washington Industrial Park
Fort Washington, PA 19034

Attn: Factory Service Dept.

7.1 USE OF EXTERNAL MICROPHONE

The use of a good noise cancelling microphone is highly recommended when using the HT-830 in an aircraft environment. The HT-830's internal microphone is rendered inoperative when an external microphone that has been connected to the top panel speaker/microphone connector, is keyed.

Any current popular aircraft microphone may be used; the only exeption being carbon microphones. They require more current from the HT-830 than is available; and, thus, would not perform satisfactorily.

8.1 USE OF EXTERNAL HEADPHONES OR SPEAKER

The HT-830's internal speaker is rendered inoperative when an external speaker or headphones are connected to the HT-830's top panel "EAR" jack. Headphone impedance should be 600 ohms minimum, and speaker impedance should be 8 ohms.

8.1 Continued

If an external speaker (or headphones) is connected to the HT-830's top panel 6 pin speaker/microphone connector, it would be in parallel with the unit's internal speaker. To prevent this, a dummy jack should be installed in the top panel "EAR" jack. Any external speaker impedance should be 8 ohms. Any current popular headphones with an impedance of 300 to 600 ohms may be used.

9.1 HT-830 LICENSE REQUIREMENTS

If the HT-830 is to be used as an aircraft transceiver, the Federal Communications Commission requires that FCC Form 404 titled "Application for Aircraft Radio Station License" be submitted prior to operation.

If the HT-830 is to be used as a ground station, then FCC Form 406 titled "Application for Ground Station Authorization in the Aviation Services" must be submitted prior to operation.

10.1 NICKEL CADMIUM (NiCad) BATTERY PACK SPECIFICATIONS

Nominal Operating Voltage: 9.6 Vdc

Nominal Capacity: 500 milliamp hour

"Fully Charged State" Output Voltage: 10.8 to 11.6 Vdc

"Discharged State" Output Voltage: 8 Vdc

Quick Charge: 150 mA max/5-6 hours for full charge

Standard Charge: 45 mA/16-17 hours for full charge

Advisable Temperature Ranges: Charging: 10 to 40°C
Discharging: -30 to 60°C
Storage (3 months): -30 to 50°C

3 Months Storage Characteristics (battery fully charged and NOT connected to HT-830):

Storage Temperature: 0°C (32°F) 10 to 20% drop in battery capacity thru self-discharge
20°C (59°F) 30 to 40% drop in battery capacity thru self-discharge

Note: At a storage temperature of 45°C (113°F), after 1.5 months the battery capacity has dropped by 95%.

Battery Service Life: 300 charge/discharge cycles (minimum).

Memory Effect: NiCad batteries have a "memory effect", where the battery voltage drops in 2 levels during operation (discharge). The first level drop is approximately an 8% reduction in capacity for the first 30 to 40 minutes of operation followed by a sharp 60% drop in capacity during the next 10-15 minutes of operation. This "memory effect" is caused by repeatedly charging the batteries when they have been only slightly discharged. This is a temporary problem which can be rectified by performing 2 to 3 complete discharge/charge cycles.

10.2 BATTERY PACK CHARGING

CHARGING DEVICE	CHARGING CURRENT	CHARGING TIME
Wall Charger (supplied with HT-830)	45 mA (standard charge rate)	16-17 hours for a full charge; however, charger may be left on indefinitely without harm to the battery pack.
Optional Mobile Adapter (cigarette lighter plug)	45 mA	15-16 hours for a full charge with radio turned OFF. Radio may be operated with charger plugged in but batteries will not charge because charging current is used by the radio.
Optional Desktop Quick Charger and Stand	150 mA (quick charge rate)	5 to 6 hours with radio turned off for a full charge. (See note).

Note: The HT-830, when turned off, may be left on the quick charger indefinitely without harm to the battery pack.

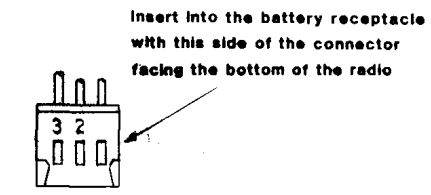
The HT-830 may be operated both in the receive and transmit modes while being charged in the Desktop quick charger/stand; however, the battery charging rate drops back to a standard rate (17 hours) because a portion of the charging current is used to power the radio.

10.3 BATTERY PACK INSTALLATION

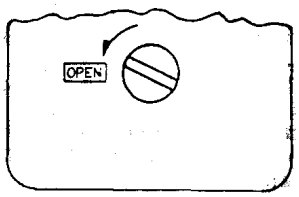
All HT-830's are shipped from the factory with the battery pack installed but NOT connected. Before using the HT-830 the battery pack must be connected to the radio and charged according to the following procedure:

- Battery Compartment Access (Refer to Figure 10-1)
  To gain access to the battery compartment, insert a coin in the large slotted screw on the rear panel and turn in the direction of the arrow. Remove the rear panel.
- Turn the HT-830's power switch to the OFF position.
- Route the battery connector and leads through the notch located at the right hand side of the battery compartment partition (See Figure 10-2).
- Insert the battery 3-pin connector into the battery receptacle observing the polarity as shown in Figure 10-3.
- Replace the rear panel.
- Charge the battery with the supplied charger for 17 hours before using the radio.

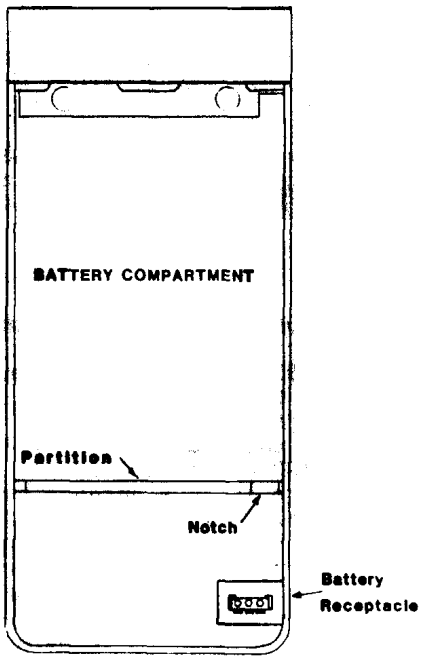
10.3 Continued



Battery Connector
FIGURE 10-3



BATTERY ACCESS
FIGURE 10-1



BATTERY INSTALLATION
FIGURE 10-2

CAUTION: Never store an HT-830 with the NiCad battery pack connected. There is internal circuitry that is always connected directly to the battery bus that draws a small amount of current (microamperes) which will deplete the battery charge within 3 weeks. Always store the HT-830 with the battery disconnected.

10.4 QUICK CHANGING THE BATTERY PACK TO PRESERVE MEMORY

If a battery pack that needs recharging is being replaced by a second fully charged pack, the exchange must be completed within 30 seconds. Failure to do so will result in the erasure of all operator selected frequencies stored in memory (M0 to M9). Always turn the HT-830's power switch OFF before installing or removing a battery pack.

10.5 OPTIONAL ALKALINE BATTERY PACK

An optional non-rechargeable alkaline battery pack is available for the HT-830 (see Section 5.3). This battery pack is an ideal choice for an emergency back-up power source as it has a storage life of approximately 2 years. The service life of the battery pack is approximately 20 hours when operating the HT-830 in the receive mode.

CAUTION: Never store an HT-830 with the battery pack connected. There is internal circuitry that is always connected directly to the battery bus that draws a small amount of current (microamperes) which will deplete the battery over time. Always store the HT-830 with the battery disconnected.

11.1 ADDITIONAL ANTENNA CONSIDERATIONS

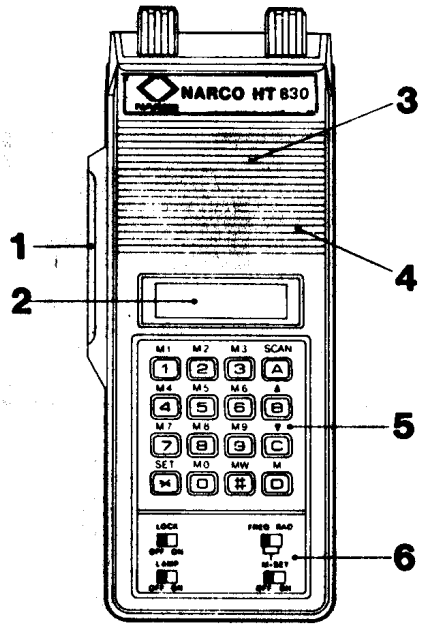
When the HT-830 is operated in an aircraft environment, an improvement in both COM and NAV performance will be realized if an aircraft type antenna is used in place of the supplied flexible whip antenna. The flexible antenna is quickly and easily removed as it incorporates a standard BNC connector. It is recommended that a standard 50 ohm impedance aircraft COM antenna be used for both COM operation and VOR reception. VOR accuracy using an aircraft COM antenna is superior to the VOR accuracy using the standard HT-830 flexible antenna which may vary as much as 5 degrees or more depending on local conditions. For maximum VOR range and accuracy, an aircraft VOR antenna may be used; however, it is not recommended that HT-830 COM transmissions be made while using a VOR antenna.

12.1 CAUTIONS TO OPERATORS

- Ensure that the battery pack is properly charged before operating.
- Never operate the transmitter without an antenna installed.
- Turn the power switch OFF before installing or removing a battery.
- Always change a battery pack in less than 30 seconds to preserve the frequencies stored in memory.
- Never turn the power switch ON while the push-to-talk (PTT) is pushed in.
- Never dispose of a NiCad battery pack in a fire.
- Never dissect a NiCad battery as they contain toxic material.
- Never store (greater than 3 weeks) the HT-830 with the battery pack connected. Disconnect the battery pack.

13.1 DESCRIPTION AND LOCATION OF CONTROLS

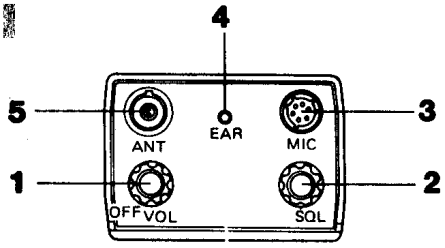
13.1.1 FRONT PANEL DESCRIPTION



1. PTT (Push to talk) Switch
2. LCD (Liquid Crystal Display)
3. Speaker
4. Microphone
5. 16-Key Keyboard
6. Function Switch Board

FIGURE 13-1 HT-830 FRONT PANEL

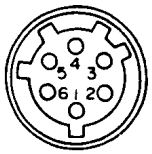
13.1.2 HT-830 TOP PANEL DESCRIPTION



1. ON/OFF Switch and Volume Control
2. Receiver Squelch Adjust
3. External Speaker/Microphone Connector
4. Earphone Jack
5. BNC Antenna Connector

FIGURE 13-2 HT-830 TOP PANEL

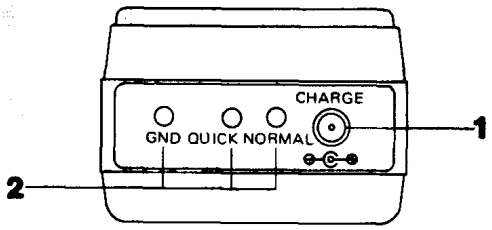
13.1.2 Continued



1. Microphone Input
2. Speaker Output
3. Push to talk Switch
4. Ground
5. No Connection
6. No Connection

FIGURE 13-3 MIC CONNECTOR PIN ASSIGNMENT

13.1.3 BOTTOM PANEL DESCRIPTION



1. Jack for External Slow Charger Adapter
2. Terminals for Optional Desk-top Quick Charger and Stand

FIGURE 13-4 HT-830 BOTTOM PANEL

13.2 16-KEY KEYBOARD DESCRIPTION

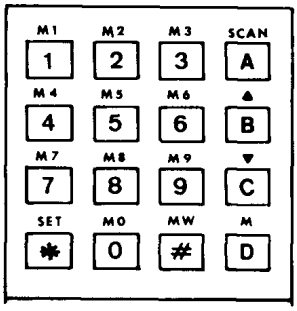


FIGURE 13-5 16-KEY KEYBOARD

The numbered keys are used to assign a frequency. The letters M0-M9 define 10 memory locations where assigned frequencies may be stored. These keys are also used to recall or access these stored frequencies.

13.2 Continued

SET KEY

This key is used to set the assigned COM or NAV frequency. After a frequency is selected and displayed, the SET KEY must be depressed. When this key is depressed, a decimal will appear after the third digit.

SCAN MODE SELECTOR KEY

This key selects any one of the 4 modes (MAN, SCAN, SRCH, OPEN) in sequence as the key is repeatedly depressed. Each mode appears in the display.

SCAN UP AND MEMORY LOCKOUT KEY

1. In the Band Mode, when this key is depressed, scanning starts toward a frequency higher than the frequency displayed.

2. In Memory Mode, scanning starts toward the next higher numbered memory channels (M0-M9) in sequence until all 10 memory channels have been scanned.

3. Memory Lockout: Any memory location, M1 to M9, may be locked out of the scanning sequence when the M-SET slide switch is ON and this key is depressed. Location M0 cannot be locked out.

SCAN DOWN KEY

1. When operating in the Band Mode and this key is depressed, scanning starts down from the frequency displayed.

2. In the Memory Mode, when this key is depressed, scanning starts toward the next lower numbered memory location that appears in the display.

MEMORY MODE KEY

When this key is depressed, the radio switches from the Band Mode to the Memory Mode of operation. Simultaneously a letter "M" (memory) appears in the upper left corner of the display.

13.2 Continued

MW
[*] MEMORY WRITE KEY

The function of this key is to place the radio in a "write to memory location" mode. This key is disabled when the M-SET slide switch is turned OFF. When the M-SET slide switch is turned ON and the Memory Write Key depressed, the letters "MW" will appear in the upper left corner of the display.

13.3 FUNCTION SWITCH BOARD DESCRIPTION

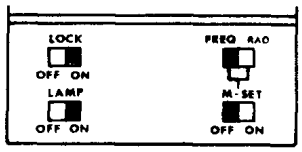


FIGURE 13-6 FUNCTION SWITCH BOARD

LOCK SWITCH

If the LOCK-ON position is set, all 16 keys are disabled and no keyboard operation is possible.

LAMP SWITCH

If the LAMP-ON position is set, the LCD is illuminated by an internal lamp to facilitate viewing in low ambient light.

M-SET SWITCH

1. When the M-SET ON position is selected and the FREQ RAD switch is set to FREQ, the Memory Write Key [MW *] is enabled permitting the programming of memory locations M0 to M9.
2. When the M-SET and FREQ slide switches are both ON and the radio is in the Memory Mode of operation, the Memory Lock Out Key [▲ B] is enabled.

13.3 Continued

FREQ-RAD SWITCH

1. When this switch is placed in the FREQ position and the M-SET switch in the OFF position, NAV or COM frequency setting (LCD displays the set frequency) and COM Band Mode scanning (automatic or manual) are possible.

2. When the FREQ and M-SET ON positions are set, selected frequencies may be stored by using the figured MW (memory write) Key and keys M0 to M9 as the locations in memory.

3. When the RAD position is selected and the active frequency is a VOR channel, the LCD indicates the VOR radial. If the active frequency is a LOC channel, the LCD indicates the letters "LOC". All keys are inoperative when a radial or LOC legend is displayed and Band scanning is not possible.

13.4 LIQUID CRYSTAL DISPLAY (LCD) DESCRIPTION

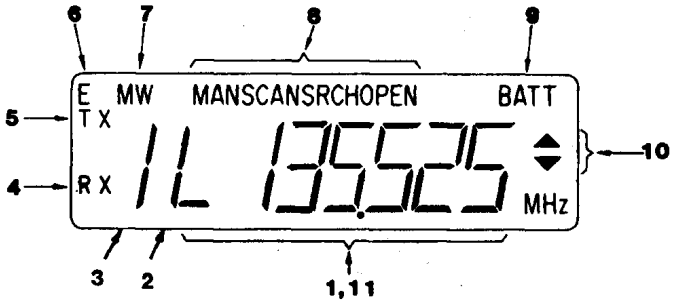


FIGURE 13-7 LIQUID CRYSTAL DISPLAY

The following appears in the display:

1. Numerical frequency in MHz is displayed in both the Band and Memory Modes. Shown displayed is 135.525 MHz.
2. The letter "L" is displayed when the HT-830 is in the Memory Mode of operation and one of the memory locations M1 to M9 has been "locked out". The display shows memory location M1 has been locked out of the scanning sequence.
3. Memory Location digit. When the HT-830 is placed in the Memory Mode of operation, and a memory location key (M0 to M9) is depressed, that location digit will appear here. Shown displayed is memory location M1.

13.4 Continued

4. The letters RX will appear here when the receiver locks on to a valid NAV or COM received signal. The received frequency will also be displayed.
5. The letters TX will appear here when the PTT switch is depressed provided the displayed frequency is a COM frequency.
6. The letter E (Error) appears here whenever an illegal setting is made into the display. In addition, all of the numerical display will blank.
7. Two modes can be displayed here. The letter M (Memory Mode) will be displayed whenever the [D] Key is depressed. The letters MW (Memory Write) will be displayed whenever the M-SET slide switch is ON and the [*] Key is depressed.
8. Scanning Modes. Four distinct sets of letters will appear here indicating the selected scan mode. When the [A] Key is depressed repeatedly, the following letters will sequentially appear: MAN (manual), SCAN, SRCH (search), OPEN.
9. Battery Alert. The letters BATT will appear here when the battery pack voltage has fallen below the lower limit of useable charge.
10. UP/DOWN Scanning. When the [B] Key is depressed, the arrow ▲ will appear (UP scan). When the [C] Key is depressed, the arrow ▼ appears (DOWN scan).
11. VOR Radial. When the FREQ RAD switch is set to the RAD position and the active frequency is a VOR/LOC channel, the VOR radial or a "LOC" legend will be displayed here.
VOR Radial Example: "F196"; LOC Legend Example: "LOC"

14.1 INTRODUCTION TO OPERATING PROCEDURES

The HT-830 may be utilized as a 720 channel COM Transceiver or a 200 channel NAV Receiver/Converter. The Unit may be operated in either the Memory or Band Modes.

The Memory Mode allows for operation over 10 NAV or COM frequencies that are operator chosen and stored in memory. Frequency scanning may be either Manual or Automatic for COM frequencies but is limited to Manual only for NAV frequencies.

The Band Mode allows for operation over all 720 COM channels or 200 NAV channels. Frequency scanning may be either Manual or Automatic for COM frequencies but is limited to a single frequency only for NAV frequencies.

14.1 Continued

Before explaining the operating procedures, consider the three following facts:

1. If the letters "BATT" should appear in the upper right hand corner of the display (see Figure 13-7), the battery pack voltage has fallen below its lowest operating limit. It should be fully recharged as soon as possible. During the time that "BATT" is displayed, the radio may be capable of a few more transmissions. However, complete discharge of the batteries is not recommended since it will require the reprogramming of memory locations M0 to M9.

2. Whenever an illegal entry or slide switch setting is made on a frequency assignment, the letter "E" (Error) will appear in the upper lefthand corner of the display and the numerical part of the display will blank. This is called an "Error Display". To remove the error, depress any Key.

3. If a frequency assignment is NOT SET within 5 seconds of entry, an Error Display will result.

14.2 POWER TURN-ON AND VOLUME CONTROL

Rotate the "VOL" knob, located on the top panel, in a clockwise direction past the switch detent to turn the Unit ON. Further clockwise rotation of the knob will increase the Audio level. Initally set the volume to 1/2 its range.

14.3 SQUELCH CONTROL OPERATION

The squelch control knob is located on the top panel and is manually set by the operator. When the knob is rotated in a clockwise direction to its stop, the squelch is in its full open position. Receiver noise should be heard and the "Rx" legend in the lower lefthand corner of the display should be annunciated. The squelch control should be set to its optimum break point by slowly turning the knob counter clockwise until the receiver noise is squelched and the "Rx" legend is blanked from the display.

CAUTION NOTE: If the Unit is operated with the squelch "open", automatic frequency scanning will not operate normally. This is because the Unit interprets the detected receiver noise as a valid received signal (Rx legend annunciated) and "locks on" the noise.

14.4 FREQUENCY ASSIGNMENT

Frequency assignments of ANY of the 720 COM channels (118.000 to 135.975 MHz) or 200 NAV channels (108.00 to 117.950) can be accomplished by using a 4 or 6 digit entry format. A frequency can only be entered when the radio is in the Band Mode.

Before proceeding with the frequency assignment instructions, the operator must now store in his own memory the following information

- **A FREQUENCY ENTRY MUST BE ACCOMPLISHED WITHIN 5 SECONDS.**
- **A FREQUENCY ENTRY CANNOT BE ACCOMPLISHED IF THE LETTERS "E" OR "M" APPEAR IN THE DISPLAY.**

MEMORY MODE DISPLAY

ERROR DISPLAY

To clear the display of the unwanted letter:

"M" - - - - depress the [D] Key

"E" - - - - depress any key

One of four scan modes (MAN, SCAN, SRCH, OPEN) will always appear in the LCD. They have no effect on frequency assignment and can be ignored.

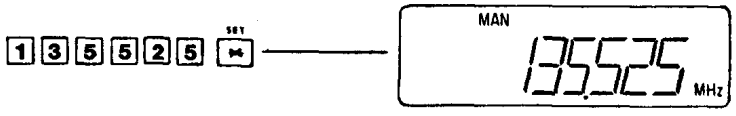
14.4.1 6 DIGIT ENTRY OF FREQUENCY

All 6 digits of the frequency are entered on the keyboard. Example: Enter 135.525 MHz. Perform steps "b" and "c" within 5 seconds.

a. Set the FREQ RAD slide switch to the FREQ position.

b. Depress in sequence, numbered keys 1, 3, 5, 5, 2, 5. The data is displayed with each stroke of a key.

c. Depress the [*] Key. A decimal will appear after the third digit.



14.4.1 Continued

An error will be generated if:

- The display is not cleared of the letter "M" or "E" if one is present before entry.
- An illegal frequency is entered.
- The total entry takes more than 5 seconds.

  Only the first 5 digits are entered.

14.4.2 4 DIGIT ENTRY OF FREQUENCY

Every one of the 720 COM or 200 NAV channels have as their first digit the number 1. The leading number 1 may be omitted and only the next 4 digits entered.
Example: Enter 115.550 MHz. Perform steps "b" and "c" within 5 seconds.

a. Set the FREQ RAD slide switch to the FREQ position.

b. Depress in sequence the numbered keys 1, 5, 5, 5. The data is displayed with each key stroke.

c. Depress the SET Key. All 6 digits and decimals will appear in the display.

An error will be generated if:

- The display is not cleared of the letter "E" or "M" if one is present before entry.
- An illegal frequency is entered.
- The total entry takes more than 5 seconds.

14.5 FREQUENCY ASSIGNMENTS TO MEMORY

Ten pre-programable COM or NAV frequencies may be stored in the HT-830's memory. These memory locations are identified on the Keyboard as letters M0 thru M9.

When the battery pack is first installed, the microprocessor automatically pre-programs locations M1 to M9 to 121.500 MHz, and location M0 to 135.975 MHz.

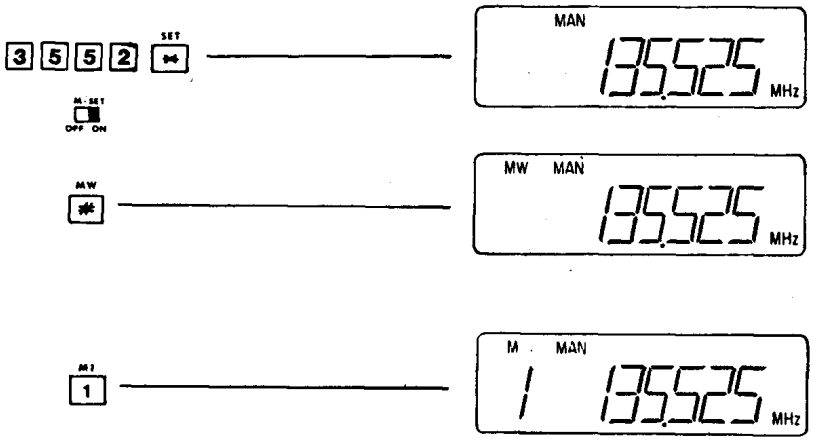
NOTE: Location M0 is special in that the frequency stored here determines the upper Band Mode scanning limit when scanning upward.

14.5.1 PROGRAMMING OF LOCATIONS M0 to M9

The following sequence illustrates memory programming:

1. Set the FREQ RAD slide switch to the FREQ position.
2. Clear the display of the letter "E" or "M" if one is present. To clear an "E", depress any key. To clear an "M", depress [D] Key.
3. Assign a NAV or COM frequency (see Section 14.4).
4. Turn the M-SET slide switch to the ON position to enable the [*] Key.
5. Depress the [*] Key. Confirm that the letters "MW" appear in the display.
6. Depress that location key (M0 to M9) at which the frequency is to be stored. When the key is depressed, the frequency is stored. Confirm that when the location key is depressed that the letters "MW" change to "M" (memory mode), and that a numeral corresponding to the location number appears to the left of the frequency in the display.
7. Depress [D] Key ("M" disappears from LCD) to take the radio out of the memory mode and put it in the Band Mode. Remember, you can only assign a frequency in the Band Mode of operation.
8. Assign a frequency for the next memory location.
9. Keep repeating Steps 5,6,7 and 8 until all the desired locations are programmed.
10. Turn M-SET slide switch OFF to disable the [*] Key.

EXAMPLE: Store 135.525 MHz in memory location **M1**.



14.5.2 RECALLING FREQUENCY FROM MEMORY LOCATION

EXAMPLE: Recall memory location M6.

a. If the radio is not in the Memory Mode ("M" annunciated in LCD) then depress [D] Key. Confirm LCD displays "M" (memory mode).

b. Depress [6] Key. Frequency and channel number are displayed in LCD.

14.6 OPERATION OF THE HT-830 AS A COM TRANSCEIVER

14.6.1 Band Mode of Operation (COM Channels)

The Band Mode of Operation permits transmission and reception over any of 720 COM channels or over selected bands. The operator may choose to receive and transmit over a single channel or to automatically scan a chosen band of frequencies.

When the FREQ RAD slide switch is in the FREQ position and the letter "M" (memory mode) does NOT appear in the display, then the radio is in the Band Mode of Operation. If the letter "M" appears in the display, then the radio is in the Memory Mode of Operation. The [D] Key must be depressed to switch the radio out of the Memory Mode and into the Band Mode of Operation.

14.6.1.1 Band Mode, Single Frequency Operation

If it is required only to receive and transmit over a single channel, then follow this procedure:

- Turn the M-SET and LOCK slide switches to their OFF position.
- Set the FREQ-RAD slide switch to the FREQ position.
- Turn the radio ON and set the Volume control to the ½ position.
- Set the Squelch to the optimum point (see Section 14.3).
- Assign the chosen frequency (see Section 14.4). Reception and transmission will be over the displayed frequency.
- Turn the LOCK slide switch to the ON position to disable the keyboard.
- To transmit, push the Push-to-talk (PTT) switch and confirm that the legend "Tx" is annunciated in the upper left edge of the display.

14.6.1.2 Band Mode Scanning

The operator must choose the following:

1. One of four types of scanning modes.
2. The upper and lower scan limits.
3. Scan direction, UP or DOWN.

14.6.1.2 Continued

Band Mode scanning proceeds UP or DOWN in 25 KHz steps.

A. SELECTION OF SCANNING MODE

To select one of the four scanning modes (MAN, SCAN, SRCH, OPEN), depress Key repeatedly while observing the display. The display shows MAN, SCAN, SRCH, OPEN, MAN------in repeated order.

B. DESCRIPTION OF SCANNING MODES

a. MAN: To select this mode, repeatedly depress the [SCAN A] Key until MAN appears in the display. The MAN (manual) scanning mode permits the operator to manually shift the frequency in 25 KHz steps by repeatedly depressing either the UP scan Key [▲ B] or DOWN scan Key [▼ C] . Each time the [▲ B] Key is depressed, an arrow ▲ appears at the right hand side of the display signifying that the previously displayed frequency was shifted up by 25 KHz. Each time the [▼ C] Key is depressed an arrow ▼ appears at the far right hand side of the display signifying that the previously displayed frequency was shifted down by 25 KHz. The frequency that appears in the display is the one the operator can receive (RX) or transmit (TX) over.

b. SCAN: To select this mode, repeatedly depress the [SCAN A] Key until SCAN appears in the display. When the SCAN mode is selected, the radio will automatically scan up or down (selected by operator) in 25 KHz steps between upper and lower frequency limits that are selected by the operator. When a busy channel is encountered (RX appears in display) the scan stops for 10 seconds and then resumes. When the scanning limit is reached, up or down, the scan automatically returns to the opposite limit and resumes.

c. SRCH: To select the SRCH (search) mode, repeatedly depress the [SCAN A] Key until SRCH appears in the display. When the SRCH mode is selected, searching will be identical to the SCAN mode except that when a busy channel (RX appears in the display) is encountered, the search STOPS and WILL NOT RESUME The search will remain frozen at this channel until the operator depresses either the [▼ C] or [▲ B] Key to resume the search scan. When the upper or lower search limit is reached the search automatically returns to the opposite limit and resumes.

14.6.1.2 Continued

d. OPEN: To select the OPEN mode, repeatedly depress the SCAN A Key until OPEN appears in the display. Scanning in the OPEN mode is identical to the SCAN mode, except that when a busy channel is encountered, the scan stops and monitors the busy channel for as long as the channel remains active. Three seconds after the signal opens, the scan is automatically resumed between its limits.

SUMMARY OF SCAN MODES

- **MAN:** Scanning UP/DOWN is accomplished manually.
- **SCAN:** Scanning UP/DOWN is automatic. Station lock-on time is 10 seconds maximum, then scan automatically resumes.
- **SRCH:** Scanning UP/DOWN is automatic. Station lock-on time is permanent. Operator must resume the search.
- **OPEN:** Scanning UP/DOWN is automatic. Station lock-on time is until 3 seconds after the signal opens, then scan automatically resumes.

C. SELECTION OF FREQUENCY SCANNING LIMITS

Both the UP and DOWN scanning directions require that the operator choose scanning limits.

a. UP SCAN LIMITS

The upper limit is that frequency which is stored in memory location M0. The microprocessor pre-programs 135.975 MHz into M0. The operator must re-program M0 to suit his requirements (see Section 14.5.1). After selecting the upper limit, the operator chooses the lower limit and assigns this frequency in the display. To start an UP scan, press the "B" Key.

The upper limit (M0) MUST BE HIGHER than the lower limit or else you CANNOT scan up. The display will just blink the displayed lower limit frequency. EXAMPLE: UP scan in the SRCH mode between 126.525 and 131.175 MHz.

1. Set FREQ RAD slide switch to the FREQ position.
2. Clear the display of the letters "E" or "M", if any are present.
3. Depress numbered Keys 3, 1, 1, 7 (upper limit).
4. Depress SET ⇔ Key.
5. Turn M-SET slide switch ON.

14.6.1.2 Continued

6. Depress [MW #] Key.
7. Depress [M0 0] Key (upper limit is now stored in location M0).
8. Turn M-SET slide switch OFF.
9. Depress [M D] Key (Radio returns to Band Mode of operation).
10. Depress [SCAN A] Key repeatedly to place SRCH in the display.
11. Depress numbered Keys 2, 6, 5, 2 (lower limit).
12. Depress [SET ⇔] Key.
13. Depress [▲ B] Key to start the UP scan. Confirm that the UP arrow ▲ appears in the display.

The radio is now scanning upward in the SRCH mode between the chosen limits.

To STOP the scan, press either the "B" or "C" key.

b. DOWN SCAN LIMITS

The upper limit in a DOWN scan IS NOT the frequency stored in location M0. Location M0 is ONLY a limit for the UP scan mode. The upper limit for the DOWN scan mode is the one the operator assigns into the display. This frequency is not stored anywhere. The lower limit is fixed and not changeable. The lower limit is 118.000 MHz. After the operator assigns the upper limit into the display, the scan mode is selected and then the down scan is initiated by pressing the "C" key.
EXAMPLE: Down scan in the OPEN mode from 119.700 MHz.

1. Set the FREQ RAD slide switch to the FREQ position.
2. Clear the display of the letters "E" or "M", if any are present in the display.
3. Depress [SCAN A] Key repeatedly to place OPEN in the display.
4. Depress the numbered Keys 1, 9, 7, 0 (upper limit).
5. Depress the [SET ⇔] Key.
6. Depress the [▼ C] Key. Confirm that the down arrow ▼ appears in the display.

The radio is now scanning downward in the OPEN mode between 119.700 and 118.000 MHz.

To STOP the scan, press either the "B" or "C" key.

14.6.1.2 Continued

SUMMARY OF SCAN LIMITS

- **UP Scan:** **upper limit is stored in location M0**
  upper limit MUST be higher than lower limit
  lower limit is assigned into the display prior to scan start
- **DOWN Scan:** **upper limit is assigned into the display prior to scan start**
  upper limit MUST be higher than 118.000 MHz
  lower limit is fixed at 118.000 MHz

It should be obvious to the reader, by now, that the smallest band of frequencies that can be scanned is that between adjacent channels while the largest band possible is top to bottom (135.975-118.000).

14.6.2 MEMORY MODE OF OPERATION

There are four differences between the Memory Mode of Operation and the Band Mode of Operation; and, they are:

- Reception and transmissions are possible only over those COM frequencies stored in locations M0 to M9.
  Note: NAV frequencies may also be stored in memory.
- There are no lower or upper scan limits to set. UP scanning is from location M0 to M9 sequentially. DOWN scanning is from location M9 to M0 sequentially.
- Memory Location Lockout: Locations M1 to M9 can be locked out of the scanning sequence. Location M0 cannot be locked out.
- PCS (priority channel scanning): This feature is restricted to the SCAN scanning mode and, in addition, only when the radio is in the Memory Mode of Operation. The SCAN Mode of scanning has an added feature called "priority channel scanning". When the radio locks onto a busy channel for 10 seconds and then resumes the scan, the scan does not begin with the next memory channel in sequence. The scan departs the normal sequence and shifts over to location M1, the designated priority channel. If M1 is not active, the scan jumps back in sequence starting with the next location above the previously locked on location. However, if M1 is busy when it is scanned, then the radio will lock onto M1 and stay locked on until the signal opens. The scan then departs M1 and jumps back into sequence starting with the location next in sequence from the previously locked on location.

14.6.2 Continued

The following sequence illustrates how to set up the radio for the Memory Mode of operation:

1. Program the required COM frequencies into memory as outlined in Section 14.5.1.
2. Select one of the four scan modes.
3. Select and initiate the scan direction.

EXAMPLE: UP scan the memory locations in the OPEN scan mode.

- If the radio is not in the Memory Mode then press the [M D] Key. Confirm appearance of "M" in the display. (Radio now in Memory Mode.)
- Depress the [SCAN A] Key repeatedly to place OPEN in the display.
- Depress the [▲ B] Key. Confirm appearance of UP arrow ▲ in the display.

  The radio is now UP scanning locations M0 to M9.
- To stop an UP or DOWN scan, press either the "B" or "C" key.
- To stop the scan at a particular location, press the appropriate location key (M0-M9).

NOTES:

1. When the transmitter is oeprated (PTT switch depressed), automatic scanning (SCAN, SRCH, OPEN) is frozen. When the PTT switch is released, automatic scanning will NOT resume. The operator must restart the scan.
2. Before an automatic scan (SCAN, SRCH, OPEN) of the COM frequencies is initiated, lock-out any NAV frequencies stored in memory as outlined in Section 14.6.2.1.

   In order to provide the highest VOR Radial accuracy, reliable lock-on in the automatic scanning modes was sacrificed.

   Reliable lock-on to NAV frequencies is achieved by pressing the memory location key of the desired NAV channel which freezes the automatic scan at that memory location.

14.6.2.1 MEMORY LOCATION LOCKOUT

The HT-830 has a memory location lockout feature that allows one or all of the locations M1 to M9 to be locked out of manual or automatic scanning. Location M0 cannot be locked out as this location determines the upper frequency limit of an UP scan. This lockout feature pertains only to the Memory Mode of Operation. When a memory location is locked out, that location is passed over in the sequential up or down scanning.

14.6.2.1 Continued

This feature will be chosen to be implemented by the operator when only a few selected stored channels need to be scanned or one or more particular channels are so busy that they interfere with the scanning of the other channels.

The following sequence illustrates the memory location lockout procedure:

a. Set the FREQ RAD slide switch to the FREQ position.

b. Depress the [D] Key to switch to the Memory Mode of Operation. Confirm that the letter "M" appears in the display.

c. Depress a memory location key (M1 to M9) to recall the location that is to be locked out. Confirm that the channel numeral is present in the display.

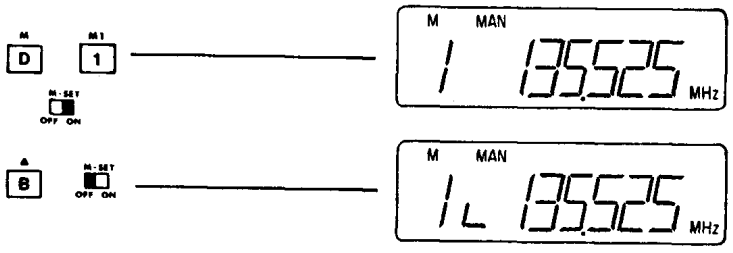
d. Turn the M-SET slide switch ON.

e. Depress the [8] Key. When the key is depressed, the channel is locked out. Confirm the presence of the letter "L" (lock-out) next to the channel number in the display. The "L" signifies that this channel is locked out.

f. If more locations are to be locked out, recall each location by first depressing its key and then the [8] Key. Follow this sequence until all desired locations are locked out.

g. Turn the M-SET slide switch OFF.

EXAMPLE: Lock out memory location M1. Stored in M1 is 135.525 MHz.



14.6.2.2 RESTORING A LOCKED OUT MEMORY LOCATION TO THE SCAN SEQUENCE

To restore a locked out channel to the scanning sequence:

1. If the radio is not in the Memory Mode, then press [M D] Key
2. Depress the memory location key (M1-M9) to recall the channel to be unlocked.
3. Turn the M-SET slide switch ON.
4. Depress the [▲ 8] Key. Confirm that the letter "L" disappears from the display signifying the return of this channel to the scanning sequence.
5. Turn the M-SET slide switch OFF.
6. Restore the scan direction.

14.7 OPERATION OF THE HT-830 AS A NAV SYSTEM

The HT-830 can function as a 200 channel NAV system since VOR navigation is made possible by the digital Radial FROM station feature.

> NOTE: For most accurate presentation of the digital radial FROM station, the HT-830 should be interfaced with an aircraft antenna (either COM or NAV) through the use of a BNC connector. VOR accuracy using the standard HT-830 flexible antenna may vary 5 degrees or more depending on local conditions.

- When the HT-830 is operated as a NAV, transmitter operation is inhibited.

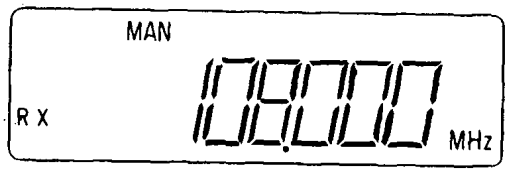
14.7.1 BAND MODE OF OPERATION (NAV channels)

The Band Mode of operation permits reception over any of the 200 NAV channels. In addition, on any VOR channel the digital Radial FROM that station may be read from the display when the FREQ RAD slide switch is placed in the RAD position. Manual or automatic scanning is inhibited in the Band Mode, therefore scan mode selection is inoperative.

14.7.1 Continued

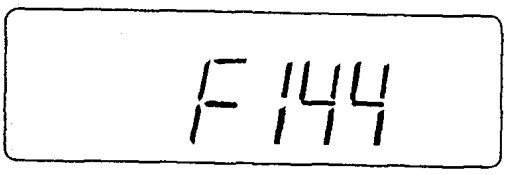
A. VOR NAV Operating Procedure

1. Turn the M-SET and LOCK slide switches to their OFF position.
2. Set the FREQ RAD slide switch to the FREQ position.
3. Turn the radio ON and set the volume control to the 1/2 position.
4. Set the squelch control to the optimum point (see Section 14.3).
5. Assign the chosen VOR frequency (see Section 14.4).
6. When the HT-830's receiver acquires a useable signal from the VOR station, an RX will appear in the lower left corner of the display as shown here in a display example.



EXAMPLE: VOR SIGNAL ACQUISITION

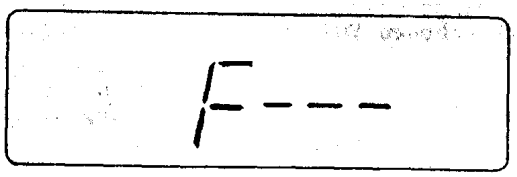
7. Set the FREQ RAD slide switch to the RAD position. The aircraft's present RADIAL position in degrees FROM the VOR station will be displayed (see example). All keys on the keyboard are rendered inoperative when the FREQ RAD switch is in the RAD position.



EXAMPLE: VOR RADIAL DISPLAY

14.7.1 Continued

NOTE: If a malfunction occurs in the radio, or the VOR signal is not acquired or useable, the numerical portion of the radial display will show "bars" indicating a fault condition. A display example is shown here.



EXAMPLE: VOR FAULT DISPLAY

8. When a Localizer frequency is present in the display and the FREQ RAD switch is placed in the RAD position, the letters "LOC" are annunciated as shown here in the display example:

EXAMPLE: LOCALIZER ANNUNCIATION

14.7.2 MEMORY MODE OF OPERATION (Combined NAV and COM operation)

The most useful operational mode for both COM and NAV operation is the Memory Mode. This means the ten memory locations will be comprised of both NAV and COM frequencies.

NOTE: When the FREQ RAD slide switch is placed in the FREQ position, normal automatic COM frequency scanning requires that all NAV channels in memory be "locked-out" as outlined in 14.6.2.1.

If automatic scanning is attempted without all NAV channels "locked-out", the scan may stop at the location adjacent to where the NAV channel is stored whenever the HT-830 attempts to lock-on to that NAV signal.

14.7.2 Continued

The following procedures may be used as a guide to operating the HT-830 in the Memory Mode.

1. Program into memory the required COM and NAV frequencies as outlined in Section 14.5.1. Lock-out all NAV frequencies per Section 14.6.2.1.

2. Ensure that the HT-830 is in the Memory Mode (letter "M" annunciated in the display). If not, press the "D" key.

3. Turn the M-SET switch OFF.

4. COM OPERATION

   a. Manual Scan

      If it is desired only to operate on a particular COM channel, then select the "MAN" mode of scan and press the Memory Location key where the desired channel is stored. Transmission and reception will be over the displayed frequency.

   b. Automatic Scan

      If it is desired to scan all the COM channels stored in memory, then select the appropriate scan mode (SCAN, SRCH, OPEN) with the SCAN "A" key. Initiate the scan direction with either the "B" or "C" key. The radio will "lock on" to any busy encountered COM channel while passing over (no lock on) those locations where NAV frequencies are stored.

5. NAV OPERATION

   a. If automatic or manual scanning of the COM channels is in effect and NAV operation is desired, then press the location key (M0 to M9) of the desired NAV channel and the scan will stop there. If the operator can't remember where the NAV channels are stored, then press the SCAN key to select MAN scan and repeatedly press the "B" key to step thru memory to the required location.

   b. When a valid NAV signal is received (RX annunciated in the display), then place the FREQ RAD switch in the RAD position and read the VOR radial from the display.

   c. If a VOR "FIX" is required, then return the FREQ RAD switch to the FREQ position and press the location key of the second VOR channel. When the NAV signal is received its radial can be read.

   d. To return to COM operation, place the FREQ RAD switch back to the FREQ position and select and restart the appropriate scan.

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